



Newsletter

Volume 15, Number 3
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Director's Note

IES scientists have written or edited 24 books since the Institute opened in 1983. Books represent a major form of synthesis — the process of bringing existing information together to discover patterns, mechanisms and interactions — by integrating facts and ideas into a coherent whole. Synthesis of their own research findings with those of others is one of the hallmarks of the work of our scientists.

Dr. Juan Armesto, IES adjunct scientist, has been awarded a Guggenheim Fellowship to write a book about management and conservation of temperate forests. In his book, Dr. Armesto will integrate his findings as a forest ecologist with those of other experts in the fields of ecology, natural history and social science. This important project is described in the article on page 1.

The *IES Newsletter* is published by the Institute of Ecosystem Studies, located at the Mary Flagler Cary Arboretum in Millbrook, New York.

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You Can't Have Your Forests and Use Them Too ... or Can You?

Imagine a forest set aside as a park. With the woodland safe, humans carve out chunks of the surrounding landscape, converting vast tracts to agricultural lands, residential areas, commercial districts. Then disaster strikes — a forest fire, or a blight, or a catastrophic blow-down — and the trees in the park are destroyed. Will the forest be able to recover, now that the adjacent lands have been stripped of the diversity of trees needed to produce seeds for reestablishment? Probably not.

Environmentalists work hard to preserve forests, frequently by lobbying to create parks. Foresters, with an eye toward commercial uses of trees, often are opposed to the environmentalists' efforts. Ecologists increasingly are realizing that conservation cannot be left solely to parks, and that human influences on surrounding ecosystems must be taken into consideration to ensure successful conservation efforts.

Ecosystems typically have been studied from one of two perspectives: plant-animal interactions, or biogeochemical cycling*. Throughout history, however, the human presence — roads, houses, agriculture, the people themselves — has had a significant impact that in large part has been ignored in ecosystem study. Now, Dr. Juan Armesto, forest ecologist at the Universidad de Chile and adjunct scientist at IES, is combining the knowledge he has gained in his studies of the forests in Chile with an understanding of the important role that humans play in ecosystems. By so doing, he plans to come up with ways to protect forest ecosystems, and their wealth of biological diversity, and at the same time allow people to use wisely the broad range of valuable resources in forests. The result, he hopes, will be simultaneous management, protection and conservation of forests.

The project earned Dr. Armesto a fellowship from the John Simon Guggenheim Memorial Foundation. As a Guggenheim Fellow, he will spend a sabbatical year writing a book addressing the problem of management and conservation of currently threatened temperate forests of southern South America. By integrating

* *Biogeochemical cycling* — or *nutrient cycling*, if the elements concerned are essential to life — is the movement of chemical elements from organism to physical environment (soil, water or atmosphere) to organism in more or less circular pathways.

three elements — ecological principles, natural history of forest plants and animals, and the needs, interests, values and accumulated knowledge of the humans who live in forests — he anticipates that the book will have applications to conservation issues not only in Chile but in other parts of Latin America and the world, as well.

The working title of the book is *Natural History, People and Conservation of Forests*. Writing for scientists and managers as well as for a general public interested in science and environmental issues, Dr. Armesto will explore the need for seeing the whole system — the forest and its surroundings — as a unit, and will propose ways to conserve and manage forests that are practical and relate to present and future human needs.

Dr. Armesto is spending several months planning and writing at IES because, he explains, the Institute is unique in having a history of integrating people's needs with ecosystem research and models. He also is consulting with a number of IES ecologists, some of whom will contribute

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Dr. Juan Armesto holds a copy of *Ecología de los bosques nativos de Chile* (Ecology of the Native Forests of Chile), his first book (with co-editors Carolina Villagran and Mary Kalin, both botanists at the Universidad de Chile). Now, as a Guggenheim Fellow, Dr. Armesto is writing a book about natural history, people and conservation in forests.

Water Wonders: More Than Just a Trip to the Pond!

by Thomas A. Moorcroft

"The pond looks like a turtle with three legs and hair on its head."

— description of Cary Pond by a 5th grade Water Wonders participant

During late spring and fall each year, hordes of 1st through 8th graders from local schools become junior ecologists and explore Cary Pond through the Institute of Ecosystem Studies' Water Wonders program. During this Ecology Field Program, students spend two hours investigating ecological relationships at the pond. The Water Wonders lesson plan, first developed in 1994, is flexible and constantly fine tuned by IES educator Kris Desmarais and me to meet the individual needs of each group.

Water Wonders is divided into four different stations. At each station, students are encouraged to open their minds and explore nature with their five senses as they grapple with questions that require them to think critically and creatively. Each station is set up to explore an element of pond ecology, such as decomposition or food webs, through a hands-on activity. For example, at the Dissolved Oxygen Station students perform a chemical test to determine how much oxygen is in the pond water. Then they discuss the effects of different oxygen levels on aquatic plants and animals.

IES educators have long been proud of this program, firmly believing that students experience more than just a fun field trip to a pond; they acquire a basic understanding of pond ecology. However, like all ecologists, we wanted evidence to support our claim. An innovative assessment program was developed to help us evaluate students' knowledge before and after their visit to Cary Pond to see what they are or are not learning. The assessment begins before the field trip with a guided journaling activity — journaling is an informal way of writing essays, much like writing in a diary — that is followed by an interactive slide-show tour of Cary Pond. After the field trip, students do another journaling activity followed by a debate. The debate requires students to synthesize all they have learned at Cary Pond and apply it to a hypothetical environmental issue: a proposed development project at Cary Pond.

I am always pleasantly surprised and often amazed at student insights. Following the program, one 5th grade student told us, if all the plants in the pond were killed "all the herbivores would die then all the

carnivores would die because they eat the herbivores. That is called the food chain". Another 5th grader explains this concept further by telling us that food chains exist "because everything is something else's food". One afternoon I was reminded by a student that smaller animals use plants as shelter from larger predators and may also feed on very small animals that live among the plants.

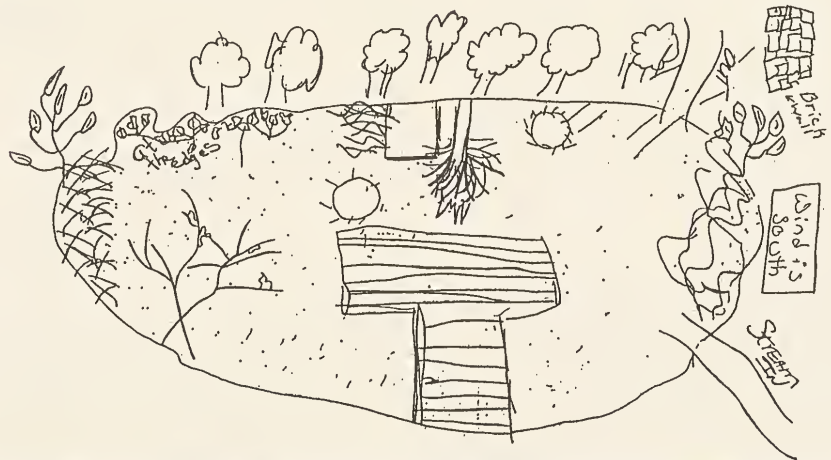
After analyzing the results of the autumn 1997 evaluation, we see a marked increase in students' post-program scores. We now have evidence to support our claim of the strength of the Water Wonders learning experience. For example, when asked to name four non-living things at the pond and how the pond life interacts with each, one student was able to come up with only one example prior to the field trip. Following the field trip, however, this student provided four correct examples and told us a "dead fallen down tree"

could be used as a "nesting spot for a bird that might feed on animals in the pond".

One of the most useful aspects of our assessment is that it not only allows us to determine if our students are learning, but it also helps us to identify program shortcomings and ecological concepts that students may have a difficult time understanding. With these insights we are able to improve our program to meet both the needs of our visiting junior ecologists and the educational goals of local schools.

Thomas Moorcroft, an AmeriCorps member, is doing ecology education and evaluation at the Institute.

As members of AmeriCorps, young people provide a year of service to a variety of social and environmental programs across the United States, in exchange for a modest living stipend and an educational award to help pay student loans or tuition costs.



This drawing of Cary Pond is by 5th graders in Mrs. Synan's class at Mill Road School, Red Hook, N.Y. In the foreground is the "T-dock", from which students can observe the pond's plant and animal life.

Forests, from page 1

essays to complement the book's contents by providing additional ideas, information and illustrative case studies.

Dr. Armesto's proposal to the Guggenheim Foundation was an elaboration of a challenge he gave to himself: "I'm a scientist. How can I help people who want to manage forests?" The prestigious fellowship that he received to work toward this challenge will, he hopes, help turn the homelands of people into a new concept of park, where the need to protect the environment and the need to use the environment become complimentary goals rather than opposing ones.

The John Simon Guggenheim Memorial Foundation was established by United States Senator Simon Guggenheim and Mrs. Guggenheim as a memorial to their son. The Foundation offers fellowships to further the development of scholars and artists by assisting them to engage in research in any field of knowledge and creation in any of the arts. Guggenheim Fellowships are awarded through two annual competitions. One is open to citizens and permanent residents of the United States and Canada, and the other is open to citizens and permanent residents of Latin America and the Caribbean. There were 278 applications in the latter category in 1997. Dr. Armesto was one of the 32 recipients.

IES Notes

• Mary Flagler Cary, whose father was a founding member of The Millbrook Garden Club, was also a member of that organization. In 1915 the club was elected to membership in the Garden Club of America, and Mrs. Cary began receiving copies of the *Garden Club of America Bulletin*. In the late 1960s, Joyce Harris Stanton, now president of The Millbrook Garden Club, was invited by the caretaker of the Cary home, which was about to be torn down, to come take a last look around the house. There, she discovered stacks of these bulletins, dating from 1915 to 1942. In April of this year, she donated the collection to the Institute of Ecosystem Studies.

Mrs. Stanton described how, even in its earliest days, the *Garden Club of America Bulletin* included articles about conservation and the importance of using native plants in gardening. Here, she donates a set of the earliest copies to IES Trustee Jeanne Blum, *left*, who is also a member of The Millbrook Garden Club. Both Mrs. Stanton and Mrs. Blum are members of the Institute's Aldo Leopold Society.



MOLLY HEARN

• Visitors to the Institute of Ecosystem Studies pass a meadow management demonstration as they follow the drive to the Plant Science Building. The first field



MOLLY HEARN

on the left is mowed. The second field on the left is burned. Burning is an effective way to foster bluestem, a warm-weather grass, and prevent the meadow from being overtaken by shrubs, trees and broad-leaved herbaceous plants. These cool-weather plants start growing first, and are set back, or sometimes killed off, by a well-timed burn. Bluestem grass, on the other hand, gets a boost from the increased warmth and light in the now open space. The Institute burns this field every other year, on a windless day in early spring. Flames are controlled by a fire break, with a complement of fire-fighting equipment standing by. Within several weeks, the meadow is already green with sprouting bluestem. *Above*, IES grounds foreman Mr. Allan Kling patrols the perimeter of the burn with a water hose.

• The cover story of this issue of the newsletter describes work supported by a Guggenheim Fellowship. In 1994, Dr. Clive Jones, an IES chemical ecologist, was selected for a similar honor, and as a Guggenheim Fellow pursued a study

relating global environmental change, particularly increases in atmospheric carbon dioxide and temperature, to the quality of plants as food for other

organisms. He did the bulk of this research in England, at the Centre for Population Biology at Imperial College at Silwood Park, using a controlled environmental facility called an Ecotron. Dr. Jones and his collaborators, among them IES adjunct scientist Dr. John H. Lawton, determined that increases in atmospheric carbon dioxide may affect long-term processes in soils via changes in the release of carbon from plants into the

soil. These findings were published in the 17 April 1998 issue of the journal *Science*.

• Increasingly, health professionals are recognizing the links between ecological relationships and the disease process. In April, a two-day symposium at the American Museum of Natural History brought together an international body of experts to present evidence for "The Value of Plants, Animals and Microbes to Human Health". Dr. Richard Ostfeld, IES animal ecologist, spoke on *Ecology and Lyme Disease*, explaining how diseases often have an intricate life in nature before humans enter the scenario, and that understanding the ecology of diseases can help us avoid or prevent them. ■

Dr. Hogan's Dissertation Receives Recognition

IES Educational Research and Development Specialist Kathleen Hogan, *right*, earned her doctoral degree in Educational Psychology and Statistics from the State University of New York at Albany in July 1997. Now, her dissertation — *Thinking Aloud Together: A Test of an Intervention to Foster Middle School Students' Collaborative Scientific Reasoning* — has received two awards. In April, at the National Association for Research in Science Teaching annual meeting in San Diego, Dr. Hogan was honored with the 1997 NARST Outstanding Dissertation Award. And, in mid-May, the University at Albany recognized her with a 1998 Presidential Distinguished Doctoral Dissertation Award.



MOLLY HEARN

Dr. Hogan currently is comparing how 8th graders reason about ecosystem dynamics, alone and with their peers. She also is developing ecology programs for after-school groups; these programs will serve as a venue for her future investigations of science learning while providing educational enrichment for local youth. ■

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Calendar

CONTINUING EDUCATION

For a **summer semester** catalogue, listing July and August courses and excursions, or for program information, call the Continuing Education office at 914/677-9643.

SUNDAY ECOLOGY PROGRAMS

Free public programs are offered on occasional Sundays. Call 914/677-5359 to confirm the day's topic or, in case of poor weather, to learn the status of the day's program. Meet at 2 p.m. at the Gifford House on Route 44A for:

June 7: **Environmental Monitoring Program and Tour of the IES Weather Station**, led by Ms. Vicky Kelly
July 12: **A Stream Walk**, led by Dr. David Strayer

• *We recommend that participants wear long pants tucked into socks and sturdy waterproof shoes for all outdoor programs.*

VOLUNTEER OPPORTUNITIES

The IES Education Program needs volunteers ...

Ecology Shop: assist with sales transactions, greet and orient visitors (afternoons)

Continuing Education: update computer database, assist with marketing (afternoons; work at home is an option)

Education Program Office: assist with reception, clerical work, special projects (mornings, afternoons)

For information on opportunities and benefits, call Ms. Su Marcy at 914/677-7641.

IES SEMINARS

Free scientific seminars are held each Friday from mid-September through early May. For a free schedule of fall programs, contact the seminar coordinator at 914/677-5343.

IES ECOLOGY SHOP

New in the Shop ... *Birder's World*, a bi-monthly magazine ... large canvas tote bags ... butterfly and hummingbird T-shirts ... **for children ...** more Folkmanis® puppets ... *Gardening Wizardry for Kids* (a book and activity set) ... **and in the Plant Room ...** garden trowels and kneepads ... "face pots" ... weather sticks

Senior Citizens Days: 10% off every Wed.

•• Gift Certificates are available ••

GREENHOUSE

The IES greenhouse, a year-round tropical plant paradise and a site for controlled environmental research, is open until 3:30 p.m. daily except public holidays. Admission is by free permit (see HOURS).

GROUP TOURS

Garden clubs, horticulturists, community groups, student organizations and others can request guided tours of the Perennial Garden, Fern Glen or Greenhouse, or a general tour of the Institute. Tours should be arranged four weeks in advance. For information on fees, or to make reservations, call Ms. Su Marcy at 914/677-7641.

HOURS

Summer hours: April - September

Closed on public holidays.

Public attractions are open Mon. - Sat, 9 a.m.-6 p.m. & Sun. 1-6 p.m., with a free permit*. (Note: The Greenhouse closes at 3:30 p.m. daily.)

The **IES Ecology Shop** is open Mon.- Fri, 11 a.m.- 5 p.m., Sat. 9 a.m.-5 p.m. & Sun. 1-5 p.m. (The shop is closed weekdays from 1-1:30 p.m.)

* *Free permits are required for visitors and are available at the IES Ecology Shop or the Education Program office daily until 5 p.m.*

MEMBERSHIP

Join the Institute of Ecosystem Studies. Benefits include subscription to the newsletter, member's rate for courses and excursions, a 10% discount on IES Ecology Shop purchases, and participation in a reciprocal admissions program. Individual membership: \$30; family membership: \$40. Call Ms. Janice Claiborne at 677-5343.

The Institute's Aldo Leopold Society
In addition to receiving the benefits listed above, members of The Aldo Leopold Society are invited guests at special events including spring and fall IES science updates. Call Ms. Jan Mittan at 677-5343.

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... for education, general information and the IES Ecology Shop:

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Education Program, Box R
Millbrook NY 12545-0178

Tel: 914/677-5359 • Fax: 914/677-6455

IES Ecology Shop telephone: 914/677-7649
Street address: Gifford House Visitor and Education Center, Route 44A, Millbrook, N.Y.

... IES website: www.ecostudies.org